

Adult Major Trauma – Continued

- I. Establish and maintain airway control while manually stabilizing the cervical spine.

Note:

The following management may be instituted before or during extrication or en route as appropriate. In no case should patient transport be delayed because of this management!

- II. Assess the patient's ventilatory status.

A. If the ventilatory status is inadequate:

1. Insert an oropharyngeal or nasopharyngeal airway.
2. Ventilate the patient with an adjunctive device and high concentration oxygen at a rate of 12 breaths per minute. **Assure that the chest rises with each ventilation.**

Caution:

If head injury is suspected, the Galsgow Come Scale (GCS) score is less than 8, and active seizures or one or more of the following signs of brain herniation are present, hyperventilate the patient with high concentration oxygen at a rate of 20 breaths/min.

- **Fixed or asymmetric pupils**
- **Abnormal flexion or abnormal extension (neurologic posturing)**
- **Hypertension and bradycardia (Cushing's reflex)**
- **Intermittent apnea (periodic breathing)**
- **Further decrease in GCS score of 2 or more points (neurologic deterioration)**

Do not hyperventilate unless the above criteria are met.

3. **Expose the patient's chest to locate and identify injuries and to listen for breath sounds.**
 4. **Seal any open chest wounds with occlusive dressing; Stabilize impaled objects in the chest.**
- B. If the ventilatory status is adequate,** administer high concentration oxygen as soon as possible.

Pediatric Major Trauma – Continued

- I. Establish and maintain airway control while manually stabilizing the cervical spine.
- II. Assess the child's ventilatory status, including exposing the chest to locate and identify injuries.
 - A. **If the ventilatory status is inadequate (the child is cyanotic, the respiratory rate is low for the child's age or capillary refill is greater than 2 seconds):**
 1. Ventilate the child with a pocket mask or bag-valve-mask and high concentration oxygen at a rate of up to 20 breaths per minute. **Assure that the chest rises with each ventilation.**

Caution:

If head injury is suspected, the Glasgow Coma Scale (GCS) score is less than 8, and active seizures or one or more of the following signs of brain herniation are present, hyperventilate the child with high concentration oxygen at a rate of 25 breaths/min.

- **Fixed or asymmetric pupils**
- **Abnormal flexion or abnormal extension (neurologic posturing)**
- **Hypertension and bradycardia (Cushing's reflex)**
- **Intermittent apnea (periodic breathing)**
- **Further decrease in GCS score of 2 or more points (neurologic deterioration)**

Do not hyperventilate unless the above criteria are met.

2. Expose the child's chest to locate and identify injuries and to listen for breath sounds.
3. Seal any open chest wounds with an occlusive dressing. Stabilize impaled objects in the chest.

Caution:

Adequate ventilation requires disabling the pop-off valve if the bag-valve-mask is so equipped!

- B. **If the ventilatory status is adequate (the child is breathing spontaneously at a respiratory rate appropriate for the child's age, cyanosis is absent and capillary refill is less than 2 seconds), administer high concentration oxygen (preferably humidified) by a face mask as soon as possible.**

**Suspected Head or Spinal Injuries
(Not Meeting Major Trauma Criteria)**

- I. Establish and maintain airway control while manually stabilizing the cervical spine.

Note:

If the patient is standing, assist the patient to the ground using an appropriate technique.

- II. Assess the patient's ventilatory status and assist the patient's ventilations as necessary; administer high concentration oxygen and suction as necessary.
- A. If the ventilatory status is inadequate, ventilate the patient with an adjunctive device and high concentration oxygen at a rate of 12 breaths/min (adult) or a rate of up to 20 breaths/min (child). **Assure that the chest rises with each ventilation.**

Caution:

If head injury is suspected, the Glasgow Coma Scale (GCS) score is less than 8, and active seizures or one or more of the following signs of brain herniation are present, hyperventilate the patient with high concentration oxygen at a rate of 20 breaths/min in an adult and 25 breaths/min in a child.

- **Fixed or asymmetric pupils**
- **Abnormal flexion or abnormal extension (neurologic posturing)**
- **Hypertension and bradycardia (Cushing's reflex)**
- **Intermittent apnea (periodic breathing)**
- **Further decrease in GCS score of 2 or more points (neurologic deterioration)**

Do not hyperventilate unless the above criteria are met.

- B. If the ventilatory status is adequate, administer high concentration oxygen as soon as possible.
- III. Assess the patient's circulatory status.
- IV. Obtain and record the patient's initial vital signs, including the Glasgow coma Scale and a neurological assessment (i.e., level of consciousness [AVPU], pupils, and sensory and motor function in the extremities) before and after spinal immobilization.
- V. Immobilize the patient's head and spine with a rigid cervical collar and an appropriate immobilization device (i.e., a KED, Kansas Board, XP1, or shortboard) if the patient is sitting or a longboard if the patient is in a face-up position.

Appendix – Pediatric

Appropriate Ventilatory Rates for Assisted Ventilation

<u>Age Group</u>	<u>If Respiratory Rate Is:</u>	<u>Ventilate At:</u>
Infant (<1 yr)	< 30/min	20/min
Toddler (1-2 yr)	< 25/min	20/min
Preschooler (3-5 yr)	< 20/min	20/min
School Age (6-12 yr)	< 15/min	20/min
Adolescent (13-18 yr)*	< 10/min	12/min

Appropriate Ventilatory Rates for Hyperventilation in Severe Head Injury with Coma and Seizures or Herniation

<u>Age Group</u>	<u>Hyperventilate At:</u>	
Infant (<1 yr)	25/min	➔
Toddler (1-2 yr)	25/min	
Preschooler (3-5 yr)	25/min	
School Age (6-12 yr)	25/min	
Adolescent (13-18 yr)*	20/min	

Hyperventilate only in GCS<8 and one or more are present:

- Active seizures
- Asymmetric pupils
- Cushing’s reflex
- Periodic breathing
- Neurologic posturing
- Neurologic deterioration

Criteria for Tachypnea (Rapid Respiratory Rate)

<u>Age Group</u>	<u>Hyperventilate At:</u>	
Infant (<1 yr)	>60/min	➔
Toddler (1-2 yr)	>40/min	
Preschooler (3-5 yr)	>35/min	
School Age (6-12 yr)	>30/min	
Adolescent (13-18 yr)*	>30/min	

Use this formula to estimate the upper limit of respiratory rate in pediatric patients 1-10 yr

$40-(2x \text{ age})$

Criteria for Tachycardia (Rapid Heart Rate)

<u>Age Group</u>	<u>Heart At:</u>	
Infant (<1 yr)	>160/min	➔
Toddler (1-2 yr)	>150/min	
Preschooler (3-5 yr)	>140/min	
School Age (6-12 yr)	>120/min	
Adolescent (13-18 yr)*	>100/min	

Use this formula to estimate the upper limit of heart rate in pediatric patients 1-10 yr

$150-(5x \text{ age})$

Criteria for Hypotension (Low Blood Pressure)

<u>Age Group</u>	<u>Blood Pressure:</u>	
Infant (<1 yr)	>60/mm Hg	➔
Toddler (1-2 yr)	>70/mm Hg	
Preschooler (3-5 yr)	>75/mm Hg	
School Age (6-12 yr)	>80/mm Hg	
Adolescent (13-18 yr)*	>90/mm Hg	

Use this formula to estimate the lower limit of systolic blood pressure in pediatric patients 1-10 yr

$70+(2x \text{ age})$

*Adult Value Used